

CVN 77 Risk Management Plan



Developed by:
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NEWPORT NEWS SHIPBUILDING



CVN 77 PROGRAM RISK MANAGEMENT PLAN

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CVN 77 Risk Management Plan

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1.0 APPROACH

1.1 Introduction

Program risk threatens the ability to achieve cost, schedule and technical performance objectives. Program risks are caused by lack of complete information about the course of future events. The risk associated with a future scenario is determined by a combination of: (1) likelihood of occurrence, and (2) consequence if it occurs. The purpose of risk management is to 1) reduce the likelihood of a risk occurring, and/or 2) reduce the gravity of the consequences in the event that the unfavorable scenario is played out.

Risk is a concern for NNS and for the Navy. A realistic and workable risk management plan, conscientiously implemented, will contribute to the success of the CVN 77 program. The CVN 77 Risk Management Plan, described herein, is an organized process for identifying, assessing, prioritizing, mitigating, tracking and closing risks. It is forward looking, structured, and continuous.

CVN 77 program personnel are taking an active role in the risk management process to ensure that the approach leads to an effective use of program resources, furthers the goals of staying within cost, schedule and performance constraints, and includes the Government and contractors. The risk management function cuts across the entire CVN 77 program, addressing and interrelating cost, schedule, and performance risks that threaten the achievement of program goals. The risk management process and risk information is intended to be available to all CVN 77 personnel, including the customer and suppliers, so that everyone is responsible for identifying risks, is aware of program risks and is informed of the progress of mitigation actions.

1.1.1 Purpose

The goal of the Plan is to provide the Program Manager with risk information needed to make optimal decisions regarding uncertain future events that could threaten the ability of the program to meet cost, schedule, and performance targets.

1.1.2 Scope and Process Owner

This plan defines the methods and tools used in the risk management process to identify, assess and manage the risks associated with all aspects of CVN 77. This plan also identifies roles and responsibilities, and provides guidelines for risk identification, assessment, mitigation and tracking.

Department E47, Systems Engineering, is the process owner for Risk Management and is responsible for process maintenance and *improvement*. It is recognized that this plan calls for a new practice to be put into place for the CVN 77 program. It is expected that changes and improvements will be necessary over the course of time as Risk Management is adopted and used by CVN 77 personnel. Any suggestions should be forwarded to Dept. E47.

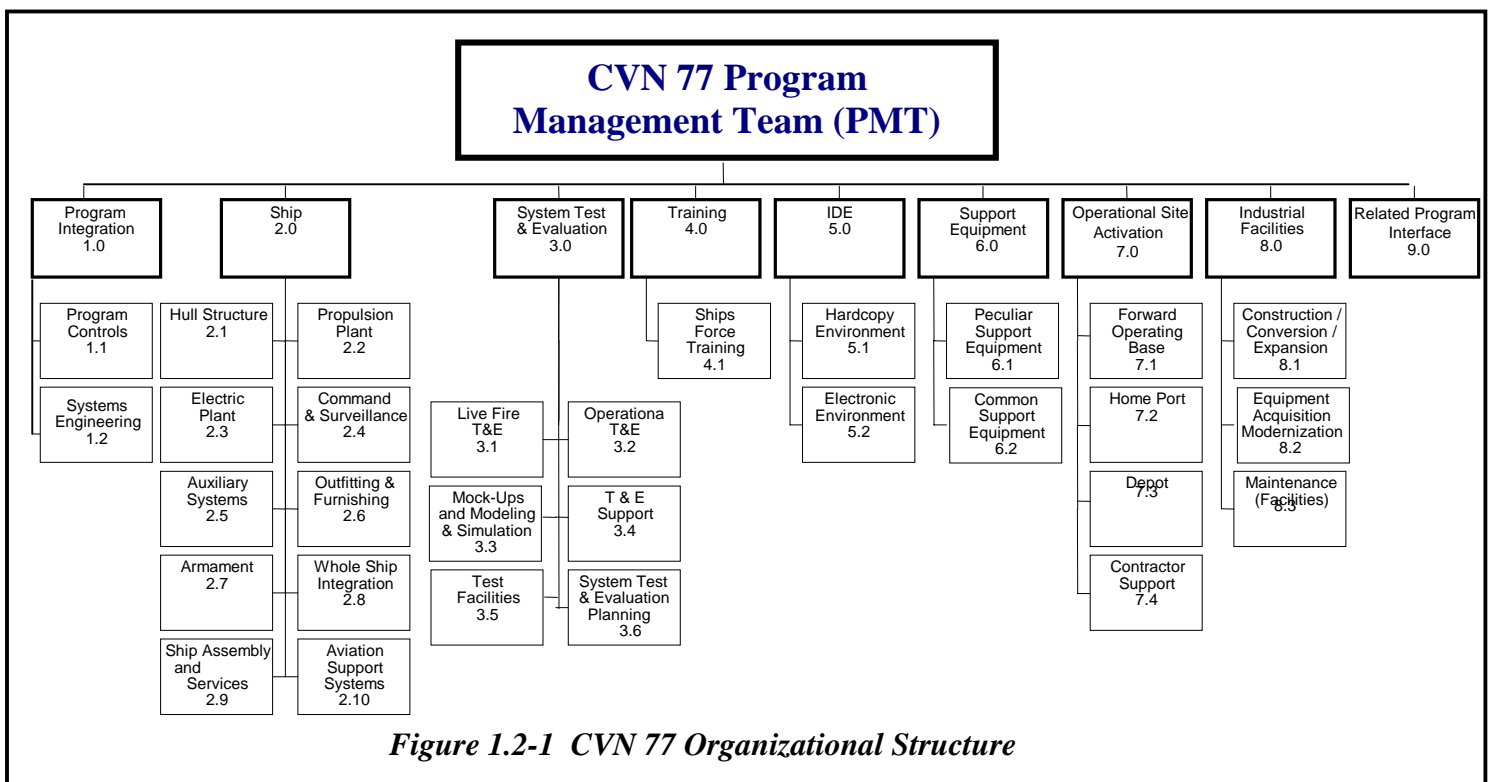
The CVN 77 Risk Management Plan is a subset of the CVN 77 Integrated Management Plan (IMP).

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1.2 Organizational Roles, Responsibilities, and Authority

Integrated Product and Process Development (IPPD) integrates all acquisition activities in order to optimize system development, production, and deployment. Key to the success of the IPPD concept are integrated product teams (IPTs). The organizational approach of the CVN 77 Program is to create an IPT structure that leverages the most qualified resources from the Government and Newport News Shipbuilding. A work breakdown structure (WBS) as the basis for team structure provides clear accountability and ownership of all product-oriented tasks, schedules and costs, and ensures total system integration through concept, design, production, testing and support phases of the program. As such, IPTs are the foundation for risk management organization. **Figure 1.2-1** depicts the CVN 77 Program organizational structure.

Note: Not all IPTs represented by the WBS structure will be formed during the AP contract. Additionally, IPTs will be created and deleted during the construction contract as requirements dictate. Therefore, it is expected that not all IPTs will exist at any given time.



1.2.1 Program Manager

Regarding CVN 77 program risk management, the Program Manager is responsible for:

- deciding how major resources are spent for risk mitigation across the program
- assigning or changing the responsibility for risks and mitigation plans within the project
- handling external communication of project risks
- working with the Program Management Team and Risk Manager to prioritize all CVN 77 risks to determine the top risks for the program
- reporting program threatening risks to Senior Management

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1.2.2 Risk Manager

The Risk Manager is responsible for:

- developing and maintaining the risk management plan
- initiating, developing and overseeing risk management training
- developing and maintaining the Risk Management Information System (RMIS)
- integrating risk information from the risk leads and IPTs
- facilitating risk mitigation planning and execution
- developing and tracking risk management metrics to evaluate the effectiveness of the risk management process
- tracking risks and the progress of mitigation plans
- working with the Program Manager and Program Management Team to prioritize CVN 77 risks to determine the top risks for the program
- advise the Program Manager on the use of independent risk assessors.

1.2.3 Program Management Team

Regarding CVN 77 program risk management, the Program Management Team is responsible for:

- ensuring accuracy of likelihood/consequence estimates and classification of high-level risks
- modifying and approving recommended mitigation plans for high-level risks
- integrating the risk management efforts of the various IPTs
- working with the Program Manager and Risk Manager to re-prioritize all CVN 77 risks to determine the top risks for the program

1.2.4 Integrated Product Team (IPT) Leads

Regarding CVN 77 program risk management, the Integrated Product Team Leads are responsible for:

- integrating risk information from all individuals within the IPT
- ensuring accuracy of likelihood / consequence estimates and the classification of risks
- reviewing recommended mitigation plans within their IPT
- prioritizing all risks within their IPT to determine top priorities
- reporting their risks to the Risk Manager
- assigning or changing responsibility for risks and mitigation plans within their IPT

1.2.5 Integrated Product Team Members

Regarding CVN 77 program risk management, the Integrated Product Teams are responsible for:

- identifying and reporting new risks to the Risk Manager via Risk Information Sheets (RISs) or the RMIS
- estimating the likelihood and consequence of risks (assessment)
- classifying risks as high, medium or low (see Section 2.2.3)

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1.2.6 Risk Leads

Regarding CVN 77 program risk management, the Risk Leads are responsible for:

- conducting tradeoff analysis for alternate mitigation plans and recommending the most effective plan
- developing the mitigation plan for assigned risks
- implementing risk mitigation plans
- statusing/reporting mitigation efforts

Note: Risk communication is vital to the risk management process. Risk communication is necessary to:

- ❑ *Make risks, plans, actions, concerns, and progress known*
- ❑ *Ensure visibility of the risk information*
- ❑ *Ensure understanding of risks and mitigation plans*
- ❑ *Establish an effective, on-going dialog between the Program Manager and the project team*
- ❑ *Ensure that appropriate attention is focused on issues and concerns*

1.2.7 Risk Training

The success of risk management is a direct result of the degree to which the members of the team, both Government and NNS, are properly trained. The CVN 77 Program Office will provide risk training during the AP contract and during IPPD Tools training after the IPTs are formed and chartered. All personnel directly involved in the CVN 77 program will receive, at a minimum, basic risk management training. In this case, basic risk management training involves teaching a basic understanding of risk, and the CVN 77 Risk Management Process described herein.

1.3 Program Interface

IPT members need to understand the relationship between risk management and other CVN 77 program elements. Listed below are major elements that impact Risk Management:

1.3.1 Integrated Management Plan (IMP)

The IMP documents the methods and procedures used to develop, manage and support a program from design through delivery. The IMP describes what, when, and how program goals and objectives will be accomplished, how program performance is measured, and how processes are managed. The IMP identifies top-level performance objectives, cost targets, and schedule milestones. Any event that may potentially threaten these targets and milestones is a risk that must be identified, assessed and mitigated.

For further information on program interface and the items in the following section, see the CVN 77 IMP.

1.3.2 Work Breakdown Structure (WBS)

A Work Breakdown Structure is a framework for integrating program technical planning, cost estimating, resource allocation, performance measurement and status reporting. The CVN 77 WBS, in conjunction with Artemis, defines the products to be developed and produced and links all work efforts to be completed to each other and to the end product. All work elements are defined within the WBS dictionary and can be expressed down to any

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discrete task. The CVN77 WBS allows for structuring and tracking of program costs by technical and schedule performance based on funding sources that are tied to a specific organizational hierarchy. WBS-based IPTs will be the organizational framework for risk management.

1.3.3 Integrated Master Schedule (IMS)

The CVN 77 Program developed an Integrated Master Schedule (IMS) to plan, integrate, and monitor program activities. Artemis, the network scheduling tool used by the CVN 77 program to implement the IMS and track schedule changes, also plays a critical role in risk management. Information provided by the Artemis network is integrated into the Risk Management process where possible. The network is useful for 1) identifying major risks that will impact overall schedule performance (i.e., critical path analysis), 2) assessing schedule consequences of risk, 3) determining overall project schedule uncertainty, and 4) monitoring project schedule performance. Linking costs to each activity in the network will also provide 1) insight into the costs associated with schedule delays, 2) total project cost risk, and 3) project performance in terms of cost.

1.3.4 Earned Value Management (EVM)

EVM provides a systematic approach for developing a work plan and executing, controlling, and measuring progress against the plan. It establishes realistic relationships among program technical performance and associated schedules and budgets. It is useful in monitoring the effectiveness of risk handling actions in that it provides periodic comparisons of the actual work accomplished in terms of cost and schedule with the work planned and budgeted. As such, it provides a basis to determine if risk handling actions are achieving their targeted results.

1.3.5 Technical Performance Measures (TPMs)

TPMs compare estimated values of essential technical performance parameters with achieved values, and determine the impact of any differences on system effectiveness. The periodic application of this technique can provide early and continuing predictions of the effectiveness of risk-handling actions or the detection of new risks before irrevocable impacts on the cost or schedule occur. The use of TPMs in risk management involves:

- Identifying the Technical Performance Parameters (TPP) that drive program costs, are on the critical path schedule, or represent a high risk factor for the program.
- Organizing the TPPs, assigning weights based on importance, and linking them to WBS tasks.
- Preparing progress plans for each TPP that compares actual and expected outcomes.
- Establishing a risk profile for each TPP that will be used to score the variances between expected and actual outcomes. For example, missing a targeted result by as little as 5 percent may represent only a 75 percent confidence factor for meeting the TPP; this confidence factor is used in calculating the earned progress.
- Using the link to the WBS tasks to document actual TPP progress to cost and schedule.

1.3.6 Requirements Management

Requirements management involves tracking, controlling, and validating the technical performance requirements the system has to meet in order to fulfill its mission objectives. This process interfaces with the risk management process in the development of mitigation plans and alternative solutions. Any alternative solution must satisfy the same performance requirements. Likewise, when a mitigation plan is to change an item or design approach, the requirements management organization (Systems Engineering) must be brought in to ensure any proposed changes to the item or to the item's requirements are integrated with the rest of the system.

1.3.7 Test and Evaluation (T & E)

A well defined T & E program is a key element in monitoring the performance of selected risk-mitigation options and developing new risk assessments.

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2. PROCESS

The flowchart shown in **Figure 2.0-1 – Description of risk management functions**, provides an overview of the risk management process.

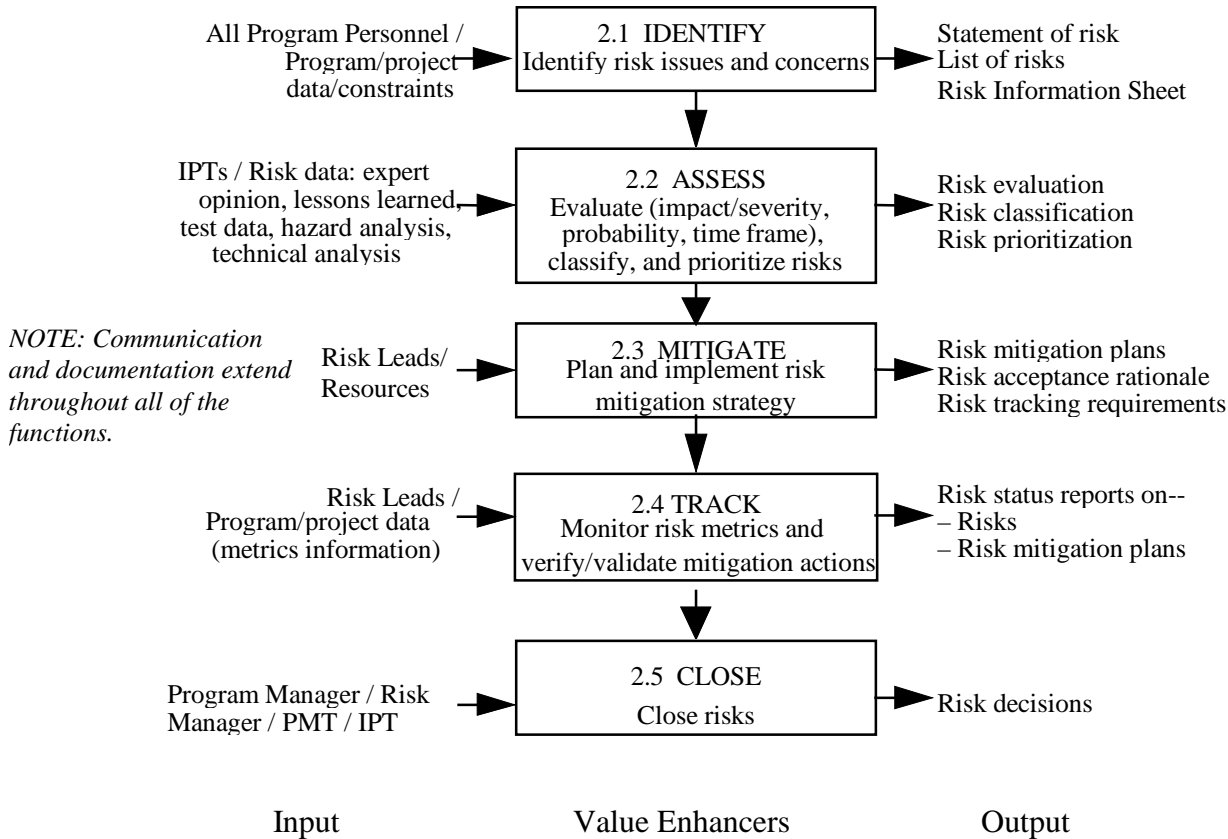


Figure 2.0-1 - Description of risk management functions.

2.1 Risk Identification

Risk identification is the first and most critical step in the risk management process. Risks cannot be assessed or managed until they are identified and described. An organized, thorough, repeatable approach to seek out the real risks associated with the program is critical.

Program personnel involved in the technical, cost, and scheduling aspects of designing, testing, manufacturing, supporting, and disposing of CVN 77 are aware of problems/issues that need to be managed as risks. Therefore, everyone involved in the CVN 77 program is responsible for identifying risks and for reporting these risks to the risk manager via the Risk Information Sheet (RIS) or the Risk Management Information System (RMIS - see Section 3.2). During detail design and throughout the program, IPTs shall review each element of the Work Breakdown Structure (WBS) under their cognizance and determine whether there are any new risks. When attempting to identify risks, it is important to consider all possible sources of risk that may effect the ability to achieve cost, schedule and technical performance objectives.

Provided below are some examples of potential sources of risk.

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- Immature technology
- New processes (design, analysis, production, etc.)
- New designs
- Design complexity and tolerance requirements
- New operational requirements
- New reliability, availability, and maintainability requirements
- Changing requirements
- Engineering change orders
- Cost and schedule estimating assumptions and accuracy
- Resource availability (people, material, crane, facilities, tools, budget, schedule, etc.)
- Unqualified people (design, engineering, production, etc.)
- Suppliers/subcontractors (availability, reliability, experience, etc.)

Any new risks shall be provided to the Risk Manager using a RIS or the RMIS. New risks identified during project related meetings shall be captured and added to the Risk Management Information System (RMIS) within two working days of the meeting. It is the responsibility of the meeting leader to make sure this is accomplished.

On the RIS, shown in Fig 2.1-1, risk statements shall be written clearly and concisely, citing only one risk condition, and one or more consequences of that condition. All other relevant information shall be captured as Context describing the circumstances, contributing factors, and related issues. Good context provides the what, how, when, where and why of the risk condition. The RMIS requires the same information. Each risk shall be identified by a running number assigned by the Risk Manager (for configuration control) and reported to the Program Office. The RIS / RMIS also ask for the WBS element(s) potentially affected by the risk. Identifying risk-affected WBS elements helps to focus mitigation efforts.

After a risk is identified, the Risk Manager passes the information to the appropriate IPT for assessment.

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Figure 2.1-1 Risk Information Sheet (RIS)

CVN 77 RISK INFORMATION SHEET																																															
RIS # _____	WBS: _____	IPT: _____	M/D/Y ____/____/____																																												
Risk Title: _____		Risk Lead: _____																																													
Risk Type <i>(Check one)</i> <input type="checkbox"/> Technical <input type="checkbox"/> Schedule <input type="checkbox"/> Cost	Description of Risk Condition: Consequence if Realized: Context <i>(what, how, why & where of risk conditions):</i>				<div style="text-align: center; font-size: small;">Place X in One Cell</div> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td>e</td><td style="background-color: green;"></td><td style="background-color: yellow;"></td><td style="background-color: red;"></td><td style="background-color: red;"></td><td style="background-color: red;"></td></tr> <tr><td>d</td><td style="background-color: green;"></td><td style="background-color: yellow;"></td><td style="background-color: yellow;"></td><td style="background-color: red;"></td><td style="background-color: red;"></td></tr> <tr><td>c</td><td style="background-color: green;"></td><td style="background-color: yellow;"></td><td style="background-color: yellow;"></td><td style="background-color: red;"></td><td style="background-color: red;"></td></tr> <tr><td>b</td><td style="background-color: green;"></td><td style="background-color: green;"></td><td style="background-color: yellow;"></td><td style="background-color: yellow;"></td><td style="background-color: red;"></td></tr> <tr><td>a</td><td style="background-color: green;"></td><td style="background-color: green;"></td><td style="background-color: green;"></td><td style="background-color: green;"></td><td style="background-color: yellow;"></td></tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> </tr> <tr> <td></td> <td colspan="5" style="text-align: center; font-size: x-small;">Consequence</td> </tr> </table>	e						d						c						b						a							1	2	3	4	5		Consequence				
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Risk Mitigation Plan <i>(Implementation plan may be provided as an attachment)</i>																																															
Action / Event		Date		Success Criteria	Risk Level if Successful	Comments																																									
		Start	Finish																																												

Send completed worksheets to Dept E47, Systems Engineering - Risk Management, Bldg 902 or to waddell_js@nns.com.

2.2 Risk Assessment

Every risk has two components that must be assessed: 1) the likelihood of occurrence, and 2) the consequences in terms of cost, schedule and technical performance impacts to the program. If there is a zero or one hundred percent likelihood of an event occurring, there is no risk because there is no uncertainty. An unfavorable situation that is certain to occur constitutes an existing problem, not a risk, and a corrective action plan should be generated and implemented separately from the Risk Management Process described in this document.

The CVN 77 Program Risk Assessment Card, **Figure 2.2-1**, is used to determine the likelihood of occurrence and the significance of its consequences. It is provided to all personnel involved in Risk Management for CVN 77 including all IPT and PMT members. IPTs shall assign an individual IPT member to be the Risk Lead for each risk owned by the IPT. This lead shall have the support of IPT members and the Risk Manager to complete the risk assessment in a timely manner. Assessments should be performed as soon as a risk is identified so that mitigation strategies can be developed and incorporated into program planning and budget projections. Risks that relate directly to one another may be put into a group by the Risk Manager to be analyzed using the affinity grouping method. The affinity grouping method groups risks that are naturally related and then identifies the one concept that ties each group together to allow a common mitigation strategy to be used to mitigate those risks.

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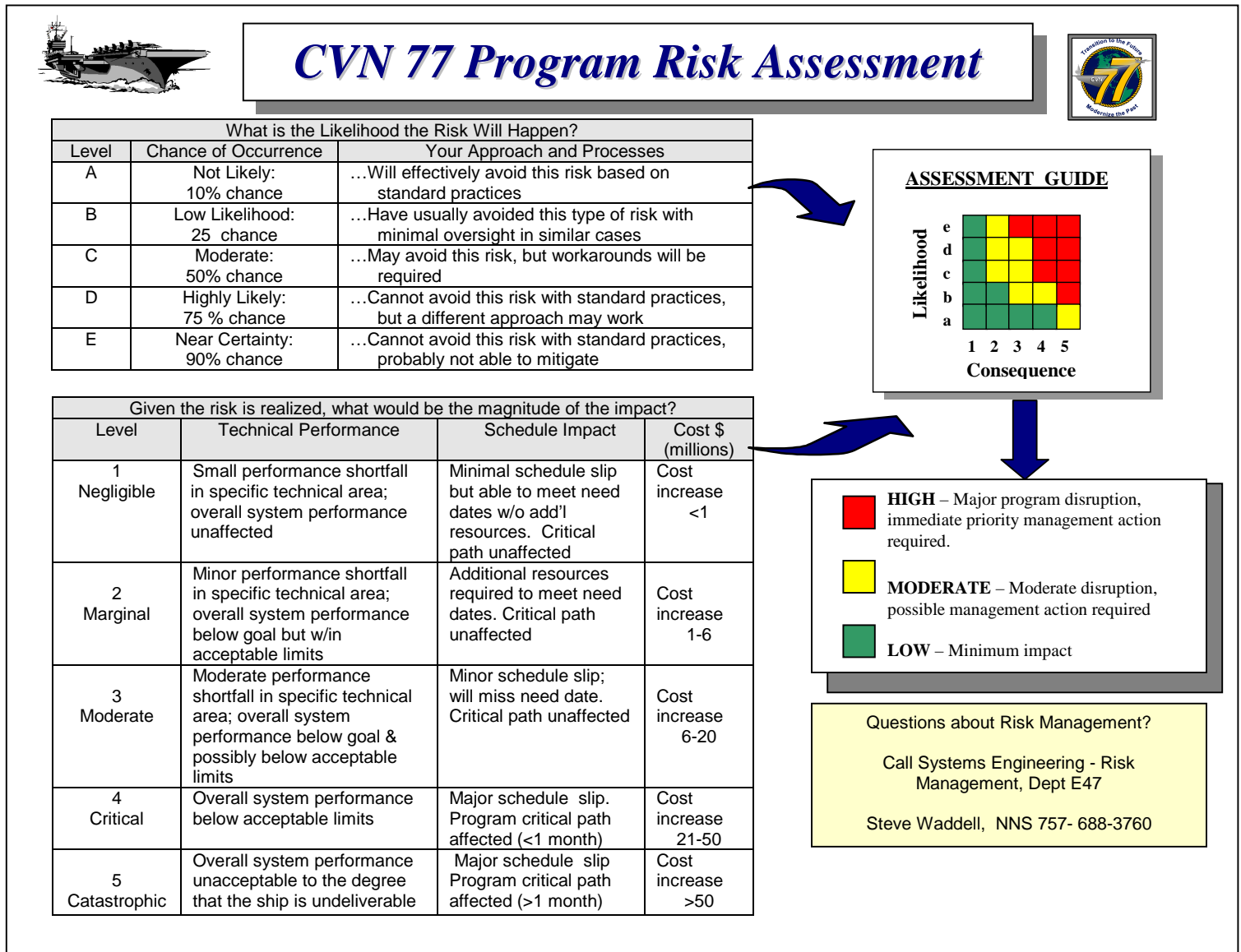


Figure 2.2-1 – Side 1 of CVN 77 Risk Assessment Card

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2.2.1 Likelihood

For each risk identified, the following question must be answered: “*What is the likelihood the risk will happen?*” There are five choices in the CVN 77 risk assessment process: *Not Likely, Low Likelihood, Moderate, Highly Likely, and Near Certainty*. In considering the likelihood of the identified risk occurring, the IPT member is encouraged to review characteristics such as those listed in section 2.1.

Figure 2.2.1-1 -
Likelihood of
Occurrence

Likelihood	What is the Likelihood the Risk Will Happen?		
	Level	Chance of Occurrence	Your Approach and Processes
	a	Not Likely: 10% chance	...Will effectively avoid this risk based on standard practices
	b	Low Likelihood: 25 % chance	...Have usually avoided this type of risk with minimal oversight in similar cases
	c	Moderate: 50 % chance	...May avoid this risk, but workarounds will be required
	d	Highly Likely: 75% chance	...Cannot avoid this risk with standard practices, but a different approach may work
	e	Near Certainty: 90% chance	...Cannot avoid this risk with standard practices, probably not able to mitigate

2.2.2 Consequence

Risk consequence is evaluated by answering the following question: “*Given the risk is realized what is the magnitude of the impact?*” There are five levels of magnitude in the CVN 77 Risk Management Process (Fig. 2.2.2-1).

Figure 2.2.2-1 -
Consequence of
Occurrence

Consequence	Given the risk is realized, what would be the magnitude of the impact?			
	Level	Technical Performance	Schedule Impact	Cost (millions)
	1 Negligible	Small performance shortfall in specific technical area; overall system performance unaffected	Minimal schedule slip but able to meet need dates w/o add'l resources. Critical path unaffected.	Cost increase <1
	2 Marginal	Minor performance shortfall in specific technical area; overall system performance below goal but w/in acceptable limits	Additional resources required to meet need dates. Critical path unaffected.	Cost increase 1-6
	3 Moderate	Moderate performance shortfall in specific technical area; overall system performance below goal & possibly below acceptable limits	Minor schedule slip; will miss need date. Critical path unaffected.	Cost increase 6-20
	4 Critical	Overall system performance below acceptable limits	Program critical path affected (<1 month).	Cost increase 21-50
	5 Catastrophic	Overall system performance unacceptable to the degree that the ship is undeliverable	Program critical path affected (>1 month).	Cost increase >50

Consequence can be assessed in terms of technical, schedule, and/or cost implications.

Technical: A risk has a technical consequence if technical goals, including form, fit, function, performance, supportability and operability, are not achievable should the risk occur and not be mitigated (including impact to other teams).

Schedule: A risk has a schedule consequence, if schedule goals are not achievable should the risk occur and not be mitigated (including impact to other teams).

Cost: A risk has a cost consequence if cost goals are not achievable should the risk occur and not be mitigated (including impact to other teams).

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When evaluating risk, it is also important to evaluate its impact on other teams. Both the consequence of a risk and the mitigation actions associated with reducing risk may impact another team. When this impact results in increased complexity, levels of risk also increase. This may involve additional coordination or management attention (resources) and may therefore increase the level of risk.

2.2.3 Assessment Guide: After deciding likelihood and consequence levels, use the Assessment Guide to obtain a level of risk (green = LOW, yellow = MEDIUM, red = HIGH). Use the definitions provided on the Risk Management Card (see Fig. 2.2.3-1) to determine if the risk level obtained from the assessment guide describes the risk. If not, consider reevaluating the level of likelihood and/or consequence.

<u>ASSESSMENT GUIDE</u>						
Likelihood	e					
	d					
	c					
	b					
	a					
		1	2	3	4	5
		Consequence				

	HIGH - Major program disruption, immediate priority management action required.
	MODERATE - Moderate disruption, possible management action required.
	LOW - Minimum impact.

Figure 2.2.3-1 - Risk Level Definitions

The Risk Manager and the PMT are responsible for the final prioritization of risks into categories.

2.2.3.1 High Level Risks: Items classed as Red are considered primary risk drivers. These risks may involve, for example,

- Failure to meet operational requirements
- Unacceptable increase in ship displacement or effect on stability of ship
- Unacceptable technical, schedule, or cost risk
- Existence of a potential catastrophic hazard

After a risk is determined to be high, a detailed analysis is required. The types and depth of the analyses will vary from one application to another, as required (the Risk Manager may be consulted to provide assistance/guidance in conducting the analysis). A detailed analysis will provide:

- Finer resolution of likelihood and consequence estimates
- Ability to expose and rank specific contributions to risk
- An opportunity to express the uncertainty in these estimates explicitly, and to identify a means of reducing these uncertainties

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- An opportunity to break down the likelihood and consequences into their constituents, enabling a better understanding of the composition of the risk and an improved ability to develop mitigation plans.

Detailed risk analyses shall be thoroughly documented by the risk lead and submitted to the Risk Manager and Program Manager. Documentation should include the objectives and purpose of the analysis, a statement of scope, the approach, project team composition, and results. Documentation shall also include an estimated dollar value impact to the program should the risk occur. Any change in estimated risk level due to detailed analysis results would replace previous judgments.

2.2.3.2 Medium Level Risks – Items classed as Yellow are considered medium risks. Medium risks may involve:

- Adverse effect on interfaces of designated installed systems
- Redirection of portions of the design
- Existence of a serious safety hazard

A detailed analysis is not required for medium- or low-level risks.

2.2.3.3 Low Level Risks – Items classed as Green represent a low impact and/or probability of occurrence. The responsible IPT shall establish performance criteria that will be tracked quarterly for status. No mitigation plans are required. Should the risk status change, the risk item shall be re-assessed and re-submitted to the Risk Manager.

2.3 Risk Mitigation

Risk mitigation strategies identify tasks that, when implemented, will reduce risk to an acceptable level by 1) reducing the likelihood of occurrence, and/or 2) reducing the consequence if it occurs. IPTs are required to develop mitigation strategies for high- and medium-level risks. Risk mitigation task descriptions should explain what has to be done, the level of effort, and the material or facilities required. They should also provide proposed schedules to accomplish the actions, cost estimates, and the target risk level that mitigation actions aim to achieve.

2.3.1 Development and Implementation of Mitigation Plans – The IPT will brainstorm potential mitigation plans and agree upon one or more plans to analyze further. The risk lead will conduct a tradeoff analysis to choose the plan that will have the greatest impact for the value of required resources. Factors such as expected risk reduction, likelihood of success, cost of implementation, resource requirements, interdependencies with other program activities, and requirements for external approval or direction should be compared among various mitigation alternatives.

Once a mitigation plan is chosen, the cognizant IPT Lead shall ensure the mitigation plan is agreed upon by IPT members and then forward it for review and approval. (See section “**2.3.2 Review and Approval**” for approval authority of mitigation plans). For a listing of different mitigation approaches and a mitigation plan template, see **Appendix A – Risk Mitigation**.

Once approved, the Risk Lead shall ensure mitigation plans are followed and the risk status is updated. The Risk Lead may assign responsibility for mitigation actions to personnel either in the IPT or in the functional areas, depending upon the action(s) required. Responsibility assignments

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shall be documented in the mitigation plans. **Figure 2.3.1-1** provides an overview of risk mitigation plan development, approval and implementation responsibilities.

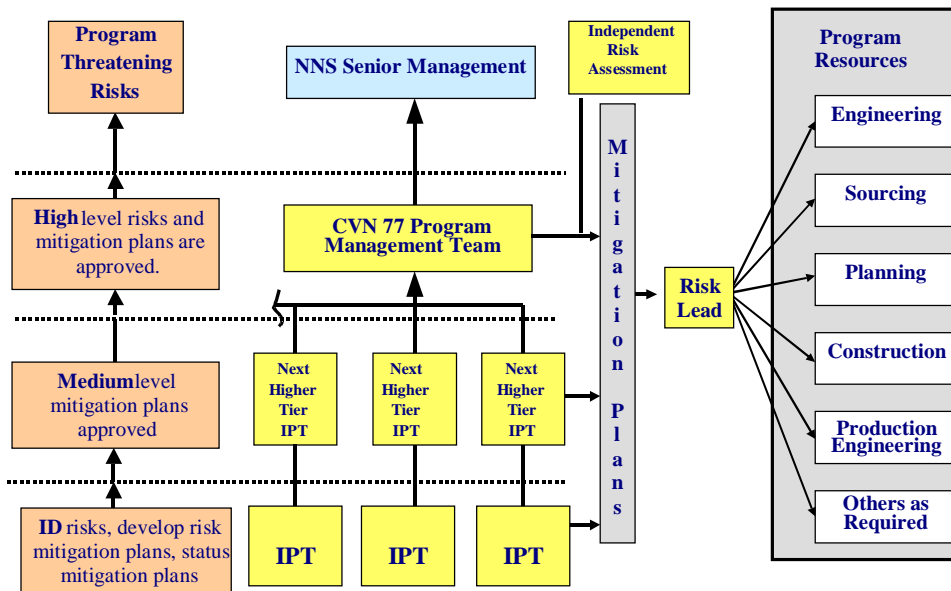


Fig 2.3.1-1 Risk Mitigation Responsibilities

The IPT Lead shall provide periodic status reports for each of the IPT's risks as required by the Risk Manager. See section 3.3 for status report frequencies.

Independent Risk Assessment is a tool to help ensure that the risk mitigation actions being taken are appropriate and without bias. Knowledgeable, experienced personnel are selected from programs other than CVN 77 (e.g., NSSN, Carrier Overhaul, etc.). Noninvolvement with the program promotes questions and observations not otherwise achievable. The use of Independent Risk Assessors will be at the request of the Program Manager as recommended by the PMT and/or the Risk Manager.

2.3.2 Review and Approval: The following mitigation plan approvals are required based upon the level of risk:

- High Risk – High-level risk mitigation plans shall be approved by the Program Manager and concurred with by the Program Management Team after detailed analyses have been performed.
- Medium Risk – Medium-level risks and their mitigation plans shall be approved by the next higher tier IPT and the Program Manager.
- Low Risk - No risk mitigation plans are required for low risk items; low risk items are handled at the discretion of the IPT.

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2.3.3 Risk Prioritization – High risks shall be initially prioritized based upon the Cost Expected Value (EV) of the exposure from each risk. The cost expected value equals the likelihood of occurrence multiplied by the cost consequence obtained through the detailed analysis. High-level risk priorities are approved by the PMT. Medium risks are prioritized by IPTs with approval by next-higher IPTs. The Program Manager may re-prioritize risks based upon other factors, and, recommendations from the Risk Manager and Program Management Team.

The Program Management Team and the Risk Manager are responsible for compiling risks from the various IPTs and prioritizing them to determine the top risks for the CVN 77 Program. The Program Management Team will examine mitigation options to optimize the use of resources for reducing risk across the entire program. The Risk Manager will provide on-line resources to assist in the prioritization effort.

2.4 RISK TRACKING

Risk tracking is a continuous process to systematically track and evaluate the performance of risk-handling actions against established metrics throughout the design and construction process. Effective tracking provides information showing whether risks, despite handling actions, are becoming actual problems. The information must be available in sufficient time to support corrective actions. Therefore, risk should be made an agenda item at each management or design review. Openly discussing risk provides an opportunity for all concerned to offer suggestions on the optimum approach for reducing risk to an acceptable level. Communication encourages early action, minimizing adverse consequences.

IPTs are crucial to effective risk tracking. They are the front line for obtaining indications that handling efforts are achieving their desired results. Risk status reports are produced by the Risk Lead for risks and risk mitigation plans to verify/validate mitigation actions towards achieving targeted values. IPT Leads shall provide routine status updates during weekly staff meetings for all high-level risk items under their cognizance. Medium-level items shall be reported on a monthly basis or more frequently as deemed appropriate by the cognizant IPT Lead. The Risk Lead is also responsible for updating risk information in the Risk Management Information System (see Section 3.2). The status of each high- and medium-level risk shall be summarized and reported to the CVN 77 Program Manager on a monthly basis, unless directed otherwise. The baseline set of risks shall be reviewed and re-established at significant program milestones (e.g. Preliminary Design Review, Critical Design Review, etc.).

If tracking results indicate an increase in risk, another assessment shall be initiated.

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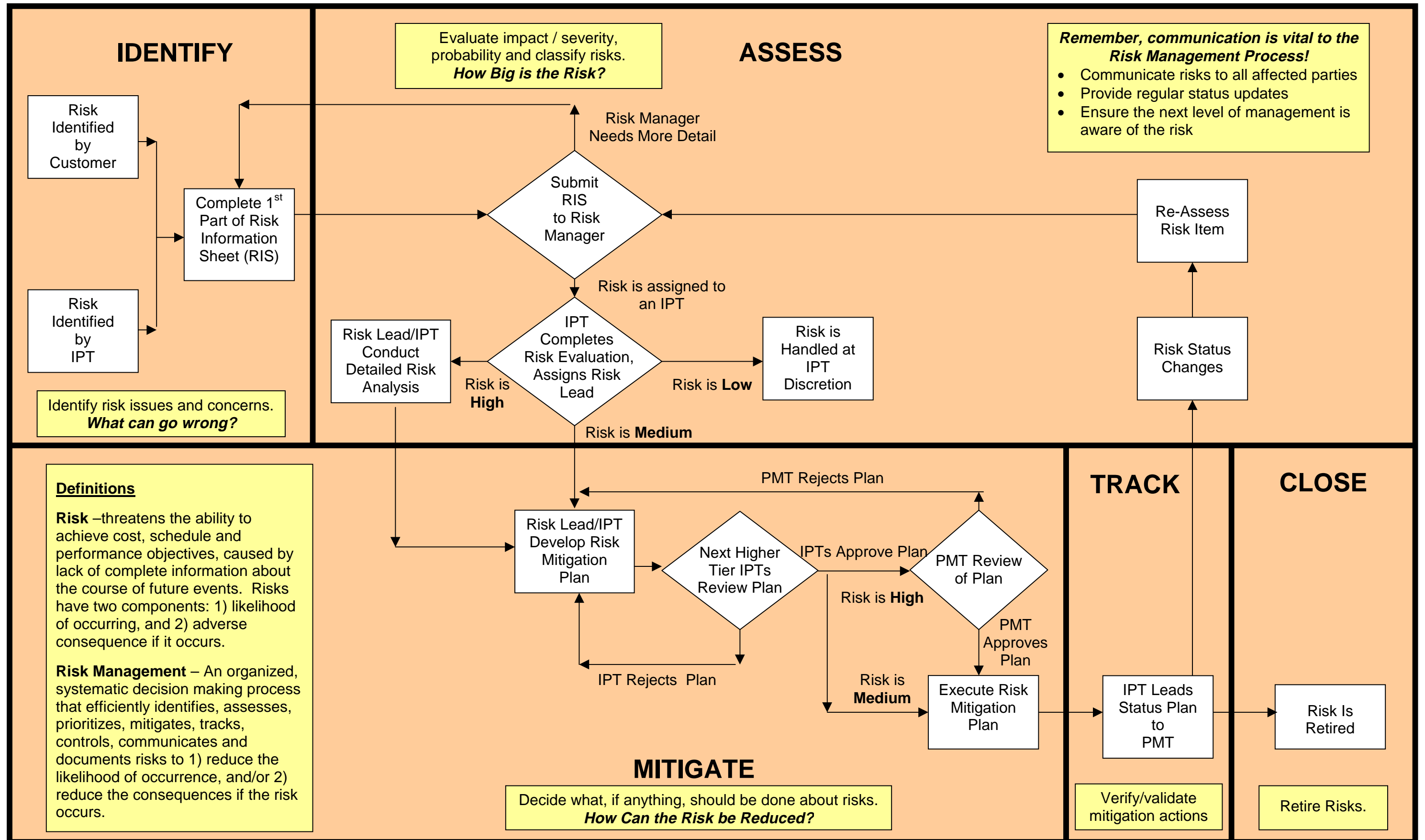
2.5 CLOSE

A closed risk is one that has met the target value stated in the mitigation plan, no longer exists or is no longer cost effective to track as a risk. The Risk Lead shall recommend closing a risk to the Program Manager by completing the Closing Rationale in the Risk Management Information System and adding the Closing Date; approval shall be by the appropriate IPT Lead(s) and Program Manager for all High and Medium Level risks.

The Risk Manager shall develop and report to the PMT a quarterly Risk Elimination Profile, which illustrates the changes in the risk portfolio over time.

2.6 Process Map - An overview of the risk management process is provided in **Figure 2.5.1**, Side 2 of the Risk Assessment Scorecard.

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Note: The process is iterative, i.e. risk tracking/controlling feeds back into the risk assessment.

3.0 TOOLS

3.1 Risk Documentation

A primary criterion for successful risk management is continuous and formal documentation of risks and risk management actions. Documentation provides:

- a framework for reporting and updating risks as the program progresses.
- a baseline for monitoring risk mitigation actions and verifying the results.
- background material for personnel new to the program.
- a rationale for program decisions.
- risk information for future programs.
- information on effective and ineffective mitigation strategies for future programs.

Documentation is done by each IPT with the support of the Risk Manager as necessary. Documentation for CVN 77 risk management includes:

- Risk Information Sheet (RIS) for each identified risk
- Risk Mitigation Plan for each Medium and High level risk
- Aggregated and prioritized risk list
- Risk Management Information System
- Risk monitoring documentation may include:
 - Risk Management Process metrics,
 - Earned value reports,
 - Watch list,
 - Schedule performance reports,
 - Risk mitigation status reports,
 - T&E reports.

3.2 CVN 77 Risk Management Information System (RMIS)

The CVN 77 program utilizes a RMIS database for storage and retrieval of risk-related data. The RMIS provides data for reports and serves as the repository for all current and historical information related to CVN 77 risk. The Program Manager will use data from the RMIS to create reports for senior management and to retrieve data for day-to-day management of the program. The RMIS produces a set of standard reports for periodic reporting and has the ability to create ad hoc reports in response to special queries. If IPTs or functional managers need additional reports, they should work with the Risk Manager to create them. Access to the reporting system will be controlled; however, any member of the CVN 77 Program may request a password to gain access to the information. The Risk Manager will maintain the list of individuals having access to the database.

Data are entered into the RMIS using the Risk Information Sheet (RIS) or the RMIS form. This gives the members of the CVN 77 team, both Government and contractors, standard formats for reporting risk-related information to the Risk Manager. The RIS should be used when a potential risk is identified and will be updated as information becomes available during the assessment, mitigation, tracking, and controlling phases.

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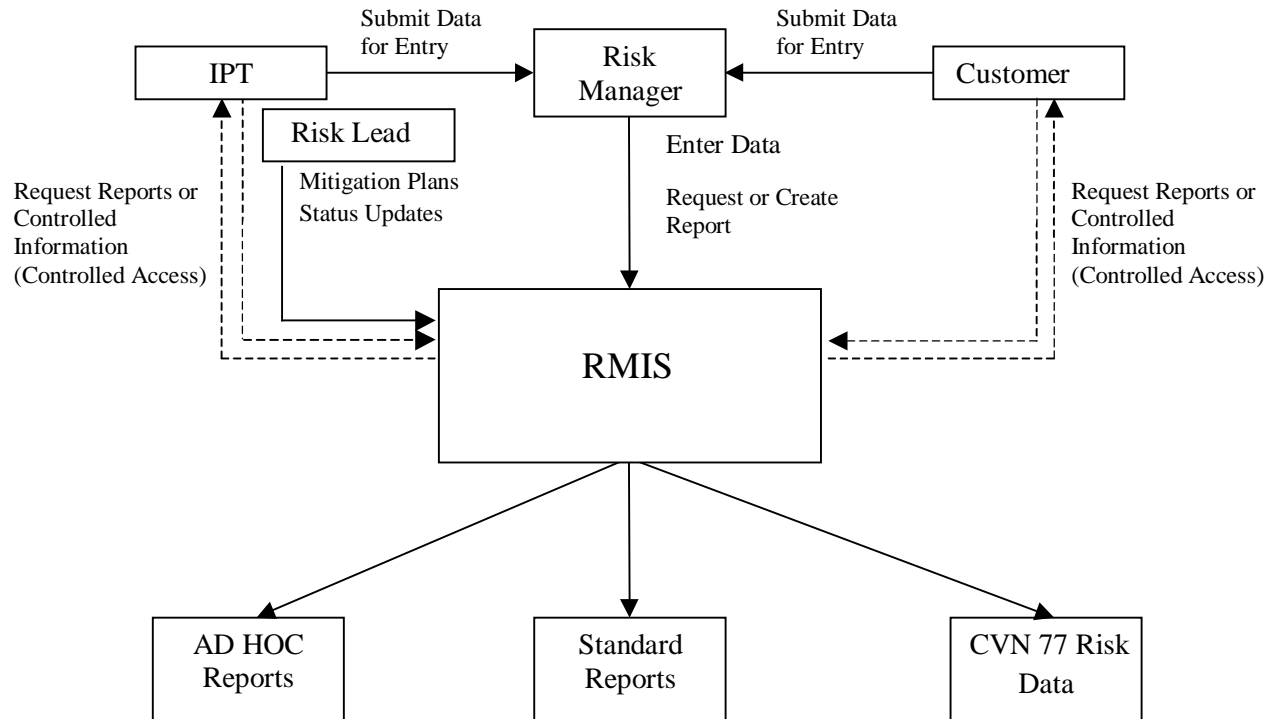


Figure 3.2-1 Risk Management and Reporting System

3.2.1 - Updating the Database

- Changes to the risk description should be limited to corrections or clarifications to the original description. A significant difference in risk description should be considered a new risk item.
- Any risk that has been entered into the RMIS, and reported to a higher authority, must be retained. The close out of each risk item will be based on the status of mitigation actions.
- Reordering risk mitigation actions or adding actions are considered acceptable without reporting it as a new risk item. If the risk item is not reduced to the target level after mitigation actions are complete, new risk mitigation actions may be required.

3.2.2 Database Security – For configuration management and security, the CVN 77 RMIS will be maintained and updated by the Risk Manager at the direction of the CVN 77 Program Manager; only the Risk Manager or designee may enter new risks into the database. The Risk Manager is responsible for maintaining the database including, updating, compiling, analyzing, and organizing risk data and reporting tracking results to the IPTs and PMT. Risk mitigation plans, status updates, etc., are entered by Risk Leads.

List of Acronyms

EV	Expected Value
EVM	Earned Value Management
IMP	Integrated Management Plan
IMS	Integrated Master Schedule
IPPD	Integrated Product and Process Development
IPDE	Integrated Product Data Environment
IPT	Integrated Product Team
NAVSEA	Naval Sea Systems Command
NNS	Newport News Shipbuilding
PMT	Program Management Team
RIS	Risk Information Sheet
RMIS	Risk Management Information System
RMP	Risk Management Plan
TBD	To Be Determined
TPM	Technical Performance Measures
TBR	To Be Revised
T&E	Test & Evaluation
WBS	Work Breakdown Structure

Appendix A – Risk Mitigation

The objective in developing effective risk mitigation actions is to reduce the likelihood and/or consequence of a risk. The most effective solution is not always the first, most obvious, or immediate one, particularly with complex risks.

A goal for each mitigation action must be identified and recorded. Goals can change, as circumstances and conditions improve or deteriorate, or as constraints of the project force acceptance of less than perfect solutions. Mitigation plans should be periodically reviewed by the IPT to ensure the mitigation goals are still sound and being met.

Risk Mitigation Strategies

The type of mitigation plan needed for a risk depends upon many factors, including:

- ❑ relative importance of the risk(s)
- ❑ complexity of the issues
- ❑ the breadth of expertise required to develop and execute mitigation strategies
- ❑ probability and impact of the risk (particularly high level risks)
- ❑ available resources

Risk mitigation strategies may include:

- **Contingency planning.** Contingencies are less attractive options and fallback positions which will be adopted if an unfavorable situation develops. The development of contingencies is applicable to areas with acceptance criteria and measurable thresholds. This should be tied in with the planned analyses, testing, and Technical Performance Measurement Program.
- **Risk transfer.** When it is possible to identify another party which is in a position to efficiently assume or share a risk, then an agreement may be reached to transfer the risk to that party. Such risk transfer is commonly accompanied by the payment of a risk premium to the risk-assuming party. Some example mechanisms for risk transfer are warranties, incentive contracts, fixed-price contracts, insurance policies, and so forth. One mitigation strategy that includes risk transfer would be to outsource the entire portion of a contract that contains the item of risk such that the risk then becomes the responsibility of the subcontractor.
- **Research and Analysis.** Research and analysis would be conducted to identify alternative technical and/or process solutions to replace existing risky ones.
- **Training.** Additional training may reduce risks associated with new processes and unqualified personnel.
- **Subcontractor/Supplier Qualification.** Specific certification, training, documentation, etc. may be required to reduce the risk associated with suppliers/subcontractors.
- **Subcontracting** may reduce the risk associated with insufficient resource availability. This is also an explicit risk transfer mechanism.

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Figure A-1 provides an Executive Summary of the detailed elements of a good mitigation strategy.

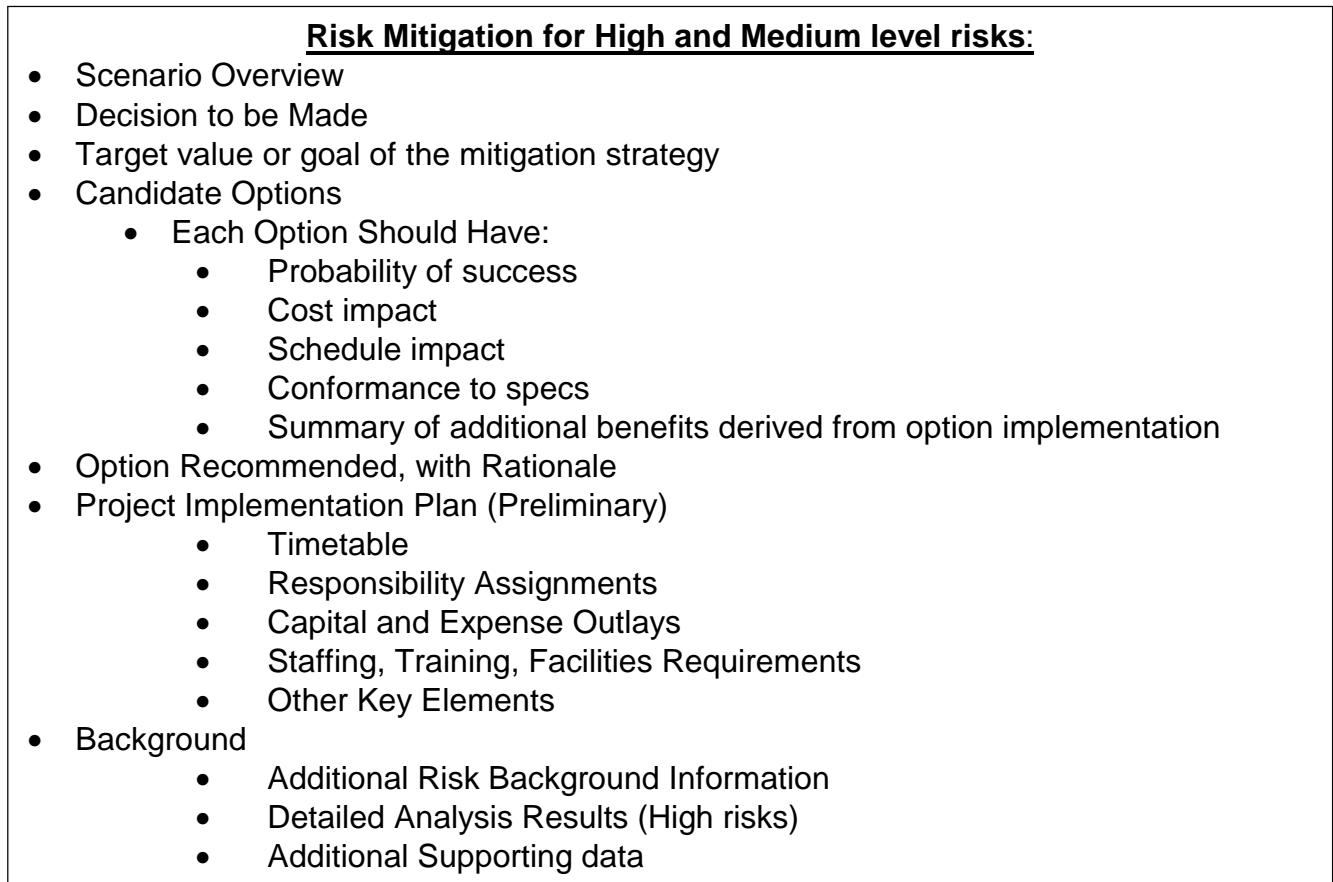


Fig A-1: Mitigation Plan Template

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